

For the sake of simplicity and generality, the special problems of the short-range operator consequent on the unreliability of landing forecasts have not been mentioned in this note; they have been fully discussed by Vivian⁴ and others.

There is no wish to imply here that any part of the meteorological service is unjustifiable, nor is any criticism of meteorologists implied. The fact remains that the operational requirement is not met. Like other twentieth-century techniques, meteorology must potentially be capable of radical improvement, however insuperable the immediate technical problems appear. The questions we ask are determinate, if not at present determinable, problems.

REFERENCES

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- ³ Sawyer, J. S. (1949). *Theoretical Aspects of Pressure Pattern Flying*. (Meteorological Report No. 3), H.M.S.O.
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Alexander Neckham and the Pivoted Compass Needle

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HISTORIANS of the mariner's compass (particularly those of the last century) have introduced into the literature of the subject a number of statements which can be shown to be incorrect, or at the least to be extremely doubtful. Unfortunately it is just these 'facts' which have been seized upon by later historians and appear in one authoritative book after another. I have myself fallen into one stock trap or another in the past.

One of these errors concerns the introduction of the pivoted compass needle. It is commonly supposed that the pivoted needle was preceded by the floating variety. The earliest report which we have of the floating needle is that given by Alexander Neckham in about the year 1187 and this type was still in use for at least the greater part of the next century.

Neckham's description in *De Naturis Rerum* is perfectly clear, but that in *De Utensilibus* is obscure. It runs:

Quia ergo munitam vult habere navem . . . habeat etiam acum jaculo suppositam; rotabitur enim et circumvolvetur acus, donec cuspidis acus respiciat orientem sicque comprehendunt quo tendere debeant nautae cum cynosura latet in aeris turbatione.

(Therefore he who wants to have a well-equipped ship . . . let him also have a needle placed under a dart; for the needle will rotate and revolve until the point of the needle looks towards the East, and thus sailors perceive in which direction they ought to go, when the Little Bear is hidden in disturbed weather.)

In March 1858 D'Avezac published an article entitled *Anciens témoignages historiques relatifs à la boussole* in the *Bulletin de la Société de Géographie* in which he suggested that *suppositam* was a copyist's error for *superpositam* and *orientem* for *septentrionem* and translates the passage thus:

Si donc on veut un navire bien pourvu de toutes choses . . . il faut avoir aussi une aiguille montée sur pivot, laquelle oscillera et tournera jusqu'à ce que la pointe se dirige au nord, faisant ainsi connaître aux navigateurs la route qu'ils doivent tenir, pendant que la Petite Ourse leur est cachée par les vicissitudes de l'atmosphère.

(If then one wishes to have a ship well provided with everything . . . it is also necessary to have a needle mounted upon a pivot which will oscillate and turn until the point is directed to the North thus showing the sailors the course they ought to take, while the Little Bear is hidden from them by changes in the atmosphere.)

D'Avezac's theory was accepted by more than one writer of note without any question and soon it became usual in histories of the compass to state categorically that Neckham had described a pivoted compass needle. I repeated it in my own work, besides allowing it to stand when revising the relevant article for the *Encyclopaedia Britannica*. Coming later, however, to trace the original quotation and its exact meaning, I became doubtful whether *jaculo* could in fact be translated as a pivot. Wishing to have a more reliable opinion on possible meanings of the Latin I consulted Dr. D. R. Dicks who has expressed himself as follows:

There seems no reason to read *superpositam* for *suppositam* or even *septentrionem* for *orientem*; *jaculum* (lit. 'spear', 'dart', and hence here an arrow-headed pointer) cannot possibly mean 'pivot' even in medieval Latin.

The repetition of *acus* (*acus, donec cuspis acus . . .*) is very clumsy even for this dog-Latin; one would expect *eius* (of it) which would look very similar in writing. I suspect, however, a further mistake at this point. The *cuspis* ought to refer to the point of the *jaculum* not the *acus*; then the magnetized needle might be placed at right angles to the dart, so that when the needle pointed North and South the dart pointed East and West—hence *orientem* is readily explicable. I suggest that a careless scribe (or even Neckham himself), automatically connecting *cuspis* with *acus* (as is very understandable when 'needle' and 'point' occur in the same sentence), overlooked the fact that, in reality, the *cuspis* referred to the *jaculum*. Hence the true reading is probably '*. . . circumvolvetur acus, donec cuspis jaculi respiciat . . .*'

A compass is known from a rather later date in which instead of a card there is a little bird whose outstretched beak is made to point to the East by means of a magnetic needle fastened across the wings. The idea of Neckham's compass having indicated the East instead of the North is not, therefore, altogether strange. The drastic rewriting of a controversial passage, such as that proposed by D'Avezac is never wise and should not be attempted as a means of providing proof of anything. One thing is clear. We cannot accept the idea that Neckham intended to describe a pivoted compass needle and we must wait for its first description until the *Epistle* of Pierre de Maricourt in 1269.